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## USEPA Comments on the April 2001 Quality Assurance Project Plan

1. *Table 1-3, Footnote 9: The USEPA notes that this footnote has not been reworded, even though the response indicated it would be. However, even the reworded footnote is not sufficient. Any reference to measuring leachate levels for five years must be stricken. Leachate levels need to be measured until an inward gradient can be maintained and until it can be shown that leachate contaminant levels do not and will not pose a threat to human health and the environment.*

Response: The existing footnote 9 has been stricken and replaced with the following:

Monitoring will continue at least through the initial USEPA 5-Year Review period. Leachate levels will continue to be measured until an inward gradient has been established and maintained, and it can be established that leachate contaminant levels do not and will not pose a threat to human health and the environment.

**QUALITY ASSURANCE PROJECT PLAN  
FOR THE  
LONG-TERM MONITORING PROGRAM**

**H.O.D. LANDFILL  
ANTIOCH, ILLINOIS**

**REVISION ~~1~~2**

**PREPARED FOR  
WASTE MANAGEMENT OF ILLINOIS, INC.**

**PREPARED BY  
RMT, INC.**

**September 2001**

Workplan (including revised pages included in the October 13, 1999, response to comments letter from RMT) was approved by the USEPA in a letter dated October 19, 1999. The RA was initiated in the summer of 2000 with the final inspection completed on July 17, 2001. The Remedial Action Report was completed and submitted to the USEPA on August 21, 2001. The RD is currently ongoing, with the RA to be initiated in summer 2000.

### **1.2.1 Facility/Size and Borders**

The site is located within the eastern boundary of the Village of Antioch in Lake County, in northeastern Illinois. The site consists of approximately 51 acres of landfilled area located on a total of 121.5 acres of property. Although the landfilled area is continuous, it consists of two separate areas, identified as the "old landfill" and the "new landfill." The "old landfill" comprises 24.2 acres situated on the western third of the property. The "new landfill" comprises 26.8 acres located immediately east of the "old landfill." The two landfill areas have been legally delineated under an Illinois Environmental Protection Agency (IEPA) permit.

The site is bordered on the south and west by Sequoit Creek. Silver Lake is located approximately 200 feet southeast of the site property. A large, seasonal wetland area extends south of the site from Sequoit Creek. The site is bordered on the north and east by open space and residential property, respectively.

### **1.2.2 Topography**

The site is situated in the vicinity of the Wheaton Moraine within the Great Lakes section of the Central Lowland Province. The topography in the area is generally characterized by gentle slopes with poorly defined surface drainage patterns, depressions, and wetlands. The maximum relief in Lake County is 340 feet.

The topography in the vicinity of the site is generally flat. The most prominent topographic feature in the area is the landfill. The maximum elevation of the landfill is approximately 800 feet mean sea level (M.S.L.). The elevation of Sequoit Creek is approximately 762 feet M.S.L. Maximum ground surface relief at the site is approximately 40 feet.

results of the predesign investigation are presented in a January 2000 report prepared by RMT titled "Predesign Investigation Results, Landfill Gas and Leachate" (RMT, 2000a), and a second report titled "Predesign Investigation Results, Groundwater" (RMT, 2000b in preparation by RMT).

## 1.4 Current Status

VOCs are the constituents identified as chemicals of concern in groundwater (Baseline Risk Assessment, ICF Kaiser, Inc., 1994; RI, Montgomery Watson, 1997a). Specifically, 1,2-dichloroethene and vinyl chloride were the VOCs that were most commonly detected during groundwater sampling Rounds 1 and 2 of the RI.

In the ROD (dated October 5, 1998), the USEPA stated that they determined that use of natural attenuation for groundwater restoration will result in expeditious attainment of cleanup levels, and that risks associated with the contaminated groundwater will be minimized in the interim. Based on monitoring data and geological information, the USEPA believes that cancer risks and other hazards to human health associated with contacting the groundwater can be minimized by monitoring the groundwater and restricting its use until the levels of contaminants in the water are below drinking water standards, background levels, and/or other health-based standards. The USEPA has determined that groundwater at the site does not pose a threat to off-site residential drinking water supplies, and that restricting groundwater use will prevent any contact with this water.

Natural attenuation is a viable remedy for contamination found in the groundwater at the site based on the specific hydrogeological conditions present. The USEPA believes that known groundwater remediation technologies will not significantly expedite the attainment of groundwater cleanup levels over that anticipated to be attained through natural attenuation. Furthermore, due to the immobile and highly localized nature of the groundwater contamination, the USEPA believes that groundwater remediation is not a suitable alternative.

The results of the predesign investigation suggest that natural attenuation is a suitable alternative in lieu of groundwater treatment. The complete results and conclusions of the groundwater predesign investigation are included in a report titled "Predesign Investigation Results, Groundwater" (RMT, 2000b in preparation).

## 1.5 Objectives of the Long-term Groundwater Monitoring Program

The objectives of the long-term groundwater monitoring program are as follows:

- To gauge the effectiveness of remedial measures and document long-term groundwater conditions in the vicinity of the site

**Step 3: Identify Inputs to the Decision** – a list of environmental variables or characteristics that will be measured and other information needed to resolve the decision statement.

1. *Identify the information that will be required to resolve the decision statement* – To resolve the decision statement, the planning team needs to obtain measurements of the constituents listed in Table 1-2 of this QAPP.
2. *Determine the sources for each item of the information identified* – The physical measurements will be made by using field equipment such as liquid level indicators, temperature probes, and pressure gages. The gas analysis will be completed using a portable gas analyzer (methane, carbon dioxide, oxygen, balance gas). The leachate will be tested using the methods listed in Table 7-1 of this QAPP.
3. *Identify the information that is needed to establish the action level* – The action levels will be based on standards specified in 35 IAC 811.310-811.312 and the PSVP.
4. *Confirm that appropriate measurement methods exist to provide the necessary data* – Physical measurements can be adequately made using field equipment. Gas analysis can be adequately completed using field-calibrated portable gas analyzers. The leachate quality will be tested using the methods listed in Table 7-1, which are below specified standards.

**Step 4: Define the Boundaries of the Study** – a detailed description of the spatial and temporal boundaries of the problem, characteristics that define the populations of interest, and any practical considerations of interest.

1. *Specify the characteristics that define the population of interest* – The proposed dual extraction points shown on Figure 3-1 of the FSAP, the gas monitoring probes (GP3, GP4A, GP5A, GP6, GP7, GP8), and the leachate storage tank, and the leachate head wells (LH1, LH2, and LH3) are included in the population of interest.
2. *Define the spatial boundary of the decision statement:*
  - a. *Define the geographic area to which the decision statement applies* – Decisions will apply to the dual extraction points, the gas monitoring probes, the leachate head wells, and the leachate storage tank.
  - b. *When appropriate, divide the population into strata that have relatively homogeneous characteristics* – not applicable.
3. *Define the temporal boundary of the decision statement:*
  - a. *Determine the time frame to which the decision statement applies* – It will be assumed that the sampling data represent current conditions at the time of sampling/monitoring.

**Table 1-2**  
**Summary of Applicable Standards for Surface Water**

COMPOUND OR FIELD PARAMETER	UNITS	STANDARD <sup>(3)</sup>
Offensive conditions	NA	Water shall be free from sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin
pH <sup>(1)</sup>	pH units	6.5 – 9.0
Specific conductance	µmS/cm	NA
Dissolved oxygen <sup>(1)</sup>	mg/L	Not less than 6.0 mg/L during at least 16 hours of any 24-hour period, nor less than 5.0 mg/L at any time
Arsenic (total)	µg/L	360
Cadmium (total)	µg/L	$\exp[A+B \ln(H)]$ , but not to exceed 50 µg/L, where A = -2.918 and B = 1.128
Chromium (total hexavalent)	µg/L	16
Chromium (total trivalent)	µg/L	$\exp[A+B \ln(H)]$ , where A = 3.688 and B = 0.8190
Copper (total)	µg/L	$\exp[A+B \ln(H)]$ , where A = -1.464 and B = 0.9422
Cyanide	µg/L	22
Lead (total)	µg/L	$\exp[A+B \ln(H)]$ , where A = -1.301 and B = 1.273
Mercury	µg/L	0.0121 <sub>3</sub> <sup>(2)</sup>
Barium (total)	mg/L	5.0
Boron (total)	mg/L	1.0
Chloride (total)	mg/L	500
Fluoride	mg/L	1.4
Iron (dissolved)	mg/L	1.0
Manganese (total)	mg/L	1.0
Nickel (total)	mg/L	1.0

**Table 1-2 (Continued)**  
**Summary of Applicable Standards for Surface Water**

COMPOUND OR FIELD PARAMETER	UNITS	STANDARD <sup>(3)</sup>
Phenols	mg/L	0.1
Selenium (total)	mg/L	1.0
Silver (total)	mg/L	5.0
Sulfate	mg/L	500
Total dissolved solids	mg/L	1,000
Zinc (total)	mg/L	1.0
Temperature <sup>(1)</sup>	°C	The normal daily and seasonal temperature fluctuations that existed before the addition of heat due to other than natural causes shall be maintained
Total ammonia nitrogen	mg/L	15
Un-ionized ammonia	mg/L	0.33 from April – October 0.14 from November – March
Hardness	mg/L	NS
1,2-Dichloroethene (total)	mg/L	1.1 <sup>(4)</sup>
Trichloroethene	mg/L	0.94 <sup>(4)</sup>
Vinyl chloride	mg/L	4 <sup>(4)</sup>
Carbon disulfide	µg/L	20 <sup>(4)</sup>

Notes:

(1) Field parameter.

(2) The numeric water quality standard for the protection of human health-aquatic organisms will apply rather than the chronic-acute standard for the protection of aquatic organisms (1-32.7 µg/L).

(3) Source: 35 IAC 302.202 through 302.212.

(4) Monthly averages cannot exceed the standard.

H = hardness.

NS = no standard.

NA = not applicable.

1. Phosphorus is not included in the surface water analytical program because Sequoit Creek does not enter a reservoir or lake in the vicinity of the landfill. 35 IAC 302.205 states that the phosphorus standard applies to any reservoir or lake with a surface area of 8.1 hectares or more, or to any stream at the point where it enters any such reservoir or lake.
2. Total residual chlorine (TRC) is not included in the surface water analytical program because there is only a need to monitor for TRC at facilities where there is periodic chlorination of discharge waters.
3. Fecal coliform is not included in the surface water analytical program because the fecal coliform standard applies to effluents (35 IAC 304.121).
4. Surface waters will not be analyzed for Gross beta, Radium 226, and Strontium 90. Radioactive parameters are not expected to be present as a result of landfilling activities at the H.O.D. Landfill.

Table 1-3  
Summary Table of Sampling and Analysis Program

MATRIX	ANALYTICAL GROUPS <sup>(1)</sup>	INVESTIGATIVE SAMPLES			FIELD-RELATED QUALITY CONTROL SAMPLES <sup>(4)</sup>					TOTAL <sup>(5,6)</sup>
		NUMBER	FREQUENCY	DURATION YEARS	DUPLICATE SAMPLES <sup>(2)</sup>	FIELD <sup>(7)</sup> BLANKS	ATMOSPHERIC BLANKS	TRIP BLANKS	MS/MSD <sup>(8)</sup>	
Groundwater	Groundwater field analyses	916	Quarterly	30	42	0	0	0	0	4018
	MNA parameters	910	Quarterly	30	1	0	0	0	01	4011
	Metal parameters	4316	Quarterly	30	2	0	1 <sup>(4)</sup> 0	0	1	4519
	Inorganic indicators	4316	Quarterly	30	2	0	4 <sup>(4)</sup> 0	0	1	4518
	Radioactive parameters	4316	Quarterly	30	2	0	0	0	1	4518
	VOCs	4316	Quarterly	30	2	0	1 <sup>(4)</sup>	5 <sup>(3)</sup>	1	2424
	SVOCs	4316	Quarterly	30	2	0	1 <sup>(4)</sup>	0	1	4519
	Pesticides/PCBs (GC)	4316	Quarterly	30	2	0	0	0	1	4518
	Pesticides (HPLC)	4316	Quarterly	30	2	0	0	0	1	4518
	Herbicides	4316	Quarterly	30	2	0	0	0	1	4518
Surface water	Field analyses	2	Quarterly	5 <sup>(9)</sup>	0	0	0	0	0	2
	Metal parameters	2	Quarterly	5 <sup>(9)</sup>	1	0	0	0	0	3
	Inorganic indicators	2	Quarterly	5 <sup>(9)</sup>	1	0	0	0	0	3
Landfill gas	Monitoring probes	6	Monthly for 3 months, then annually	As long as the system continues to operate	--	--	--	--	--	6
	Gas header at blower flare building	1	Monthly	As long as the system continues to operate	--	--	--	--	--	1
	Ambient air locations	3	Annually	5 <sup>(9)</sup>	--	--	--	--	--	3
	Gas extraction wellheads	35	Every other week for 3 months, then quarterly	As long as the system continues to operate	--	--	--	--	--	35



**Table 1-3 (Continued)**  
**Summary Table of Sampling and Analysis Program**

MATRIX	ANALYTICAL GROUPS <sup>(1)</sup>	INVESTIGATIVE SAMPLES			FIELD-RELATED QUALITY CONTROL SAMPLES <sup>(4)</sup>					TOTAL <sup>(5,6)</sup>
		NUMBER	FREQUENCY	DURATION YEARS	DUPLICATE SAMPLES <sup>(2)</sup>	FIELD <sup>(7)</sup> BLANKS	ATMOSPHERIC BLANKS	TRIP BLANKS	MS/MSD <sup>(8)</sup>	
Leachate	Extraction wells leachate levels	35	Every other week for 3 months, then quarterly	5 <sup>(9)</sup>	--	--	--	--	--	35
Leachate storage tank	Quarterly/program	1	Quarterly for 2 years, then semiannually	2 <sup>(10)</sup>	--	--	--	--	--	1
	Annual program	1	Annually	5 <sup>(9)</sup>	--	--	--	--	--	1

Notes:

<sup>(1)</sup> Analytical groups are defined as follows:

**Groundwater field analyses:** pH, SC, temperature, ORP, and DO.

**MNA parameters:** TOC, orthophosphate, nitrate, nitrite, ammonia, TKN, BOD, sulfate, sulfide, alkalinity, chloroethane, methane, ethane, and ethene.

**Metal parameters:** see Tables 1-1 and 3-16.

**Inorganic indicators:** see Tables 1-1 and 3-18.

**Radioactive parameters:** see Tables 1-1 and 3-17.

**VOCs:** see Tables 1-1 and 3-11.

**SVOCs:** see Tables 1-1 and 3-12.

**Pesticides/PCBs:** see Tables 1-1, 3-13, and 3-14.

**Herbicides:** see Tables 1-1 and 3-15.

**Surface water field analyses:** see Tables 1-2.

**Metal parameters:** see Tables 1-2 and 3-16.

**Inorganic indicators:** see Tables 1-2 and 3-18.

**Radioactive parameters:** see Tables 1-2 and 3-17.

**Landfill gas analyses (field measurements):**

**Gas probes:** pressure, methane, oxygen, nitrogen, carbon dioxide, and % LEL.

**Gas extraction wellheads:** pressure, methane, nitrogen, oxygen, carbon dioxide, flow rate, and temperature.

**Leachate storage tank:** quarterly; Table 3-6 of the FSAP, and Table 1-4 of the QAPP. Annual same as groundwater parameters (Table 1-1 excluding MNA parameters) plus COD, and Table 1-4.

<sup>(2)</sup> One sample will be collected per every 10 samples with each round of sampling.

<sup>(3)</sup> One trip blank will be analyzed for each shipment of VOC samples, assumes five shipments per monitoring round.

<sup>(4)</sup> One atmospheric blank will be analyzed during each sampling round. ~~For metals:~~ Atmospheric blanks will be analyzed for VOCs, low-level metals (antimony, berllium), thallium, atrazine and simazine only).

<sup>(5)</sup> Indicates number of samples collected during each sampling round.

<sup>(6)</sup> Total reflects the actual number of field samples collected, including the total number of investigative samples, field duplicates, and blanks, but not MS/MSD sets.

<sup>(7)</sup> No field blanks will be collected because dedicated sampling equipment will be used

<sup>(8)</sup> For the purposes of MS/MSDs, surface water, groundwater, and leachate are considered to be the same matrix.

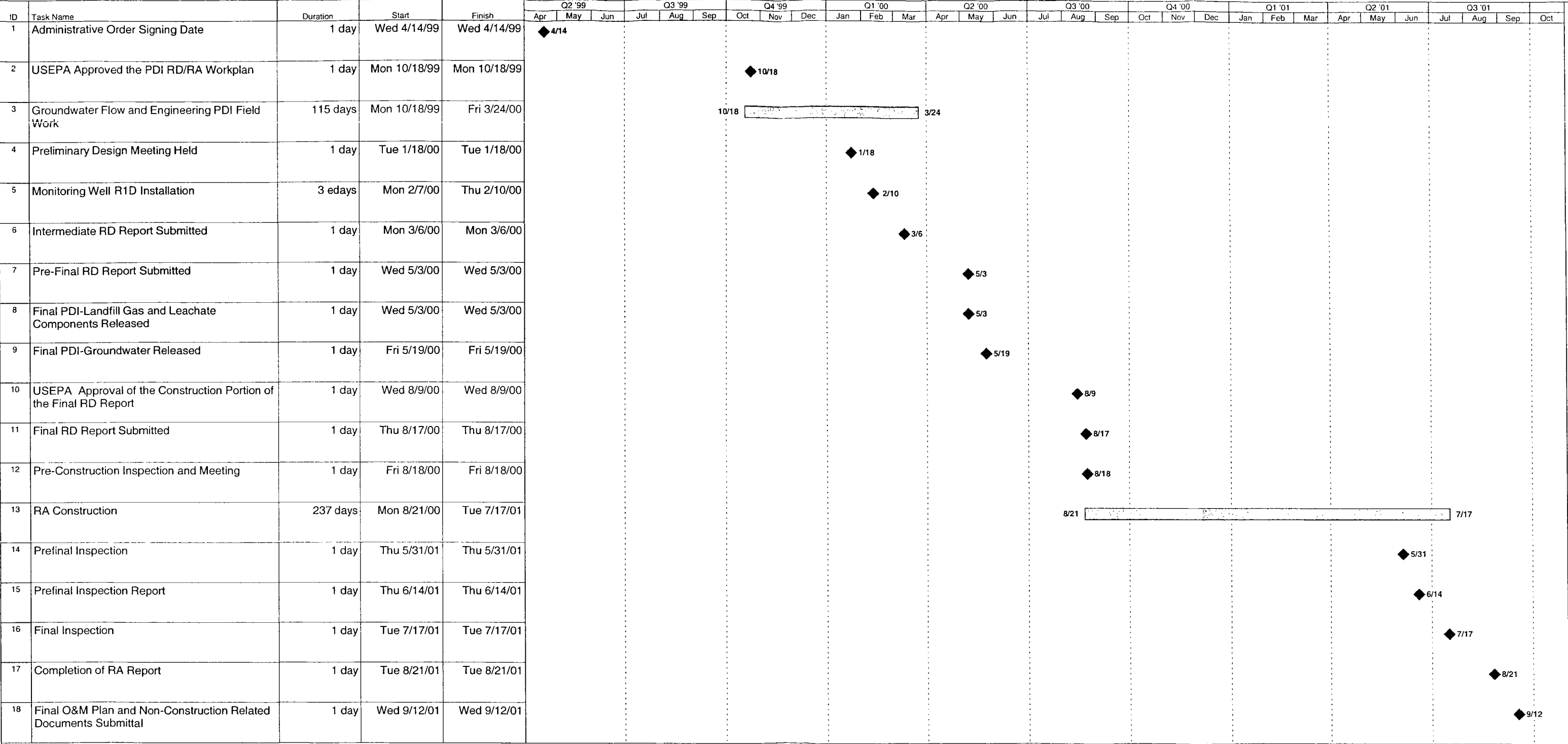
<sup>(9)</sup> ~~Monitoring will continue until the first USEPA 5-Year Review. Actual number of years may be less than five~~ Monitoring will continue at least through the initial USEPA 5-Year Review period. Leachate levels will continue to be measured until an inward gradient has been established and maintained, and it can be established that leachate contaminant levels do not and will not pose a threat to human health and the environment

<sup>(10)</sup> Quarterly for 2 years, then semiannually while the leachate management system is in operation.

**Table 1-6**  
**Rationale for Sampling Locations**

CATEGORY	ID NUMBERS	RATIONALE
Background groundwater monitoring wells	US5D	Well is upgradient of the site.
Source groundwater monitoring wells	US3D, US4D	These wells represent the highest levels of contaminants.
Downgradient groundwater monitoring wells	W8D, PZ3U, PZ4U, W6S, US6D, W3D, US2D, R1D, US4S, US1D, <u>US6S, G102</u>	Wells that are downgradient will be used to identify extent of groundwater contamination.
<u>Lateral gradient groundwater monitoring well</u>	<u>VW-3</u>	<u>Well is used for the Village of Antioch water supply</u>
Groundwater monitoring wells for measurements of hydraulic head only	US1S, US6I, W3SA, W3SB, W4S, W5S, US3S, US3I, W2D, PZ1, PZ1U, PZ2U, <u>PZ5U, PZ6U, G14S</u>	Wells that are adequately located to provide information on hydraulic gradients and groundwater flow direction.
Upstream surface water sampling point	SW1	Results will be used to define background levels of sampling parameters.
Downstream surface water sampling point	SW2	Results will be used to assess the effect of the landfill on Sequoit Creek water quality.
Leachate extraction wells	LP1, LP2, LP3, LP4, LP8, LP10, LP11, GWF2, GWF3, GWF4, GWF5, GWF8, GWF10, GW15, GW16, GW17, GW18, GW19, GW20, GW21, GW22, GW23, GW24, GW25, GW26, GW27, GW28, GW29, GW30, GW31, GW32, GW33, GW34, MHW, and MHE	Results will be used to assess leachate drawdown.
Gas header	Port at inflow to flare unit	Results will be used to balance gas management system.
Ambient air locations	AA1, AA2, AA3	Monitor if off-site LFG migration is occurring.
Gas extraction wellheads	LP1, LP2, LP3, LP4, LP8, LP10, LP11, GWF2, GWF3, GWF4, GWF5, GWF8, GWF10, GW15, GW16, GW17, GW18, GW19, GW20, GW21, GW22, GW23, GW24, GW25, GW26, GW27, GW28, GW29, GW30, GW31, GW32, GW33, GW34, MHW, and MHE	Results will be used to balance gas management system.
LFG probes	GP3, GP4A, GP5A, GP6, GP7, GP8	Monitor if off-site LFG migration is occurring.
Leachate	Leachate collection tank	Results will be used to assess whether leachate poses a threat to groundwater.

Figure 1-2 (QAPP)  
H.O.D. Landfill Pre-Design and RD/RA Schedule



## 9.3 Data Validation

Data validation procedures will be performed for both field and laboratory operations as described below.

### 9.3.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and reviewing field log books prepared by field crew members. The data will also be compared to past data for consistency, evaluated for environmental relevance, and compared for internal consistency. Unusual results will be noted, but will remain unchanged in the field logs. The data reviewer will review field notes and field chain-of-custody forms to determine that procedures specified in the FSAP and QAPP have been followed. This task will be the responsibility of the RMT Monitoring Task Leader.

### 9.3.2 Procedures to Validate Laboratory Data

The Analytical QA Manager or designated data reviewer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate, and blank results provided by the laboratory. Data validation will determine if the procedures specified in this QAPP were implemented, the data quality objectives (DQOs) specified in this QAPP were attained, the specified Quantitation Limits were achieved, and the sample holding times were met. An evaluation of data accuracy, precision, sensitivity, and completeness, based on method-specific criteria, will be performed according to the following guidance documents:

- National Functional Guidelines for Inorganic Data Review. USEPA, February 1994.
- National Functional Guidelines for Organic Data Review. USEPA, October 1999a.

All forms will be checked. All raw data, including chromatograms; quantitation reports; data system printouts; and mass spectra for samples, standards, performance evaluation mixtures, blanks, and laboratory spikes/laboratory duplicates or MS/MSDs will be reviewed.

The procedures used to evaluate data include the following items:

- All technical holding times will be checked for inorganic and organic analyses.
- Instrument performance check sample results, and initial and continuing calibration results will be evaluated.
- Data for all blanks, surrogate spikes, matrix spikes/matrix spike duplicates, laboratory control samples, cleanup standards, internal and external standards,

## Section 15

# References

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